

SOUTH EASTERN UNIVERSITY OF SRI LANKA

**THIRD EXAMINATION IN BACHELOR OF BUSINESS ADMINISTRATION /
BACHELOR OF COMMERCE – 2009 / 2010
SEMESTER – II, FEBRUARY - 2012**

MIS 3205 – MATHEMATICAL PROGRAMMING

Answer All Questions.

Time: 03 Hours

1.

i) Briefly explain the 10 rules which give the basic syntax of the LINDO modeling language.

(5 Marks)

ii) Explain the relationship between Linear programming and Integer programming.

(5 Marks)

iii)

a)

The Rainbow Company manufactures Mosquito Nets and Umbrellas. The production process includes cutting, sewing and packaging. There are 30 workers in the cutting department, 40 in the sewing department and 7 in the packaging department. The factory works one 8 hours shift, only 5 days per week. The following table gives the time requirements and profit per unit for the two products.

Minutes per unit				
Products	Cutting	Sewing	Packaging	Unit Profit
Mosquito Nets	20	15	12	250
Umbrellas	24	40	08	170

The LINDO solver gives you the following report. You are requested to formulate the Linear Programming model and do the sensitivity analysis

LP OPTIMUM FOUND AT STEP 1

OBJECTIVE FUNCTION VALUE

1) 357000.0

VARIABLE	VALUE	REDUCED COST
N	0.000000	5.000000
U	2100.000000	0.000000

ROW	SLACK OR SURPLUS	DUAL PRICES
2)	21600.000000	0.000000
3)	12000.000000	0.000000
4)	0.000000	21.250000

NO. ITERATIONS= 1

RANGES IN WHICH THE BASIS IS UNCHANGED:

OBJ COEFFICIENT RANGES

VARIABLE	CURRENT COEF	ALLOWABLE INCREASE	ALLOWABLE DECREASE
N	250.000000	5.000000	INFINITY
U	170.000000	INFINITY	3.333333

RIGHTHAND SIDE RANGES

ROW	CURRENT RHS	ALLOWABLE INCREASE	ALLOWABLE DECREASE
2	72000.000000	INFINITY	21600.000000
3	96000.000000	INFINITY	12000.000000
4	16800.000000	2400.000000	16800.000000

(12 Marks)

b)

The packaging process has been recruited 3 employees from cutting department, due to the reorganization of company's production system. Other conditions are remaining same.

Determine the new optimal production schedule for Rainbow Company.

(8 Marks)

(Total 30 Marks)

2.

i) Distinguish Branch and Bound method from Gomory approach of solving Integer programming problem.

(6 Marks)

ii) Solve the following Integer programming problem using Branch and Bound method

Max Z 3x + 4y

S.T. 2x + y <= 6

2x + 3y <= 9

x, y >= 0

(21 Marks)

iii) Consider the following table with updated columns and reduced cost shown for non basic variables. Find the Gomory cuts.

Variable	X	Y	S1	S2	-Z	RHS
Y	0	1	14/44	1/22	0	14/4
X	1	0	-1/22	6/44	0	9/2
-Z	0	0	28/11	15/11	1	63

(3 Marks)

(Total 30 Marks)

3.

- i) A project has been analyzed and the estimated times (in days) for the activities are shown below.

Activity	Optimistic time	Pessimistic time	Most probable time
1-2	1	5	1.5
2-3	1	3	2
2-4	1	5	3
3-5	3	5	4
4-5	2	4	3
4-6	3	7	5
5-7	4	6	5
6-7	6	8	7
7-8	2	6	4
7-9	5	8	6
8-10	1	3	2
9-10	3	7	5

Use backward recursive equation to find out the minimum completion time to finish this project.

(18 Marks)

- ii) Briefly explain stage, state, policy and return in terms of Dynamic programming.

(2Marks)

(Total 20 Marks)

4. Write short description to the followings.

- i) Deterministic problem
- ii) Knapsack
- iii) Overlapping sub problems

- iv) Zero – one programming problem
- v) LINDO for IP
- vi) Best IP
- vii) Shadow price
- viii) Stochastic problem
- ix) Iteration
- x) Recursive relationship

(Total 20 Marks)